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Sixty years in the making: *Isopogon nutans* (Proteaceae), a new species with pendulous flower heads

Barbara L. Rye[1] and Michael Hislop

Western Australian Herbarium, Biodiversity and Conservation Science,
Department of Biodiversity, Conservation and Attractions,
Locked Bag 104, Bentley Delivery Centre, Western Australia 6983
[1]Corresponding author, email: Barbara.Rye@dbca.wa.gov.au

SHORT COMMUNICATION

The new species of *Isopogon* R.Br. described below was first collected in October 1960 on two separate occasions, firstly by Alex George from east of Newdegate and then five days later by Charles Gardner from Mt Madden. Many years previously, Gardner had drafted a treatment of the family Proteaceae for his proposed second volume of *Flora of Western Australia*, and so was well placed to recognise the distinctiveness of this new species. He called it *I. nutans* C.A.Gardner ms (on *C.A. Gardner* 13988; PERTH), but subsequently applied the name *I. cernuus* C.A.Gardner ms to the same specimen. Neither of these manuscript names was added to Western Australia's vascular plant census.

Many years later, Foreman (1995) included all specimens of the new species within one of the subspecies of *I. teretifolius* R.Br. (see Rye & Hislop 2017), but we confirmed its distinctness and gave it the phrase name *I.* sp. Newdegate (D.B. Foreman 771) in 2002 (Western Australian Herbarium 1998–). This Western Australian endemic is finally described today, some 60 years after it was first discovered.

Isopogon nutans C.A.Gardner ex Rye & Hislop, *sp. nov.*

Type: 7 km south of Karlgarin on Lake Grace to Karlgarin road, Western Australia, 18 September 1984, *D.B. Foreman* 771 (*holo*: PERTH 05221951; *iso*: CANB *n.v.*, MEL *n.v.*, NSW *n.v.*).

Isopogon sp. Newdegate (D.B. Foreman 771), Western Australian Herbarium, in *FloraBase*, https://florabase.dpaw.wa.gov.au/ [accessed 5 February 2018].

[*Isopogon teretifolius* subsp. *petrophiloides* (R.Br.) Foreman, *Fl. Australia* 16: 481 (1995), *p.p.*, not with respect to the type.]

Shrubs to *c.* 1.5 m high, commonly 0.5–1 m wide, probably single-stemmed at base. *Young stems* smooth and reddish at first, becoming grey or brown, glabrous or early-glabrescent; hairs appressed, straight, up to 1.5 mm long. *Leaves* fairly erect regardless of stem orientation, simple, terete, 22–95 mm long, 1.1–2 mm wide, with a dense indumentum of long, white hairs when very young but glabrous at maturity; apex acute, with a pungent point 1–3 mm long. *Flower heads* axillary, pendulous, globose, 18–30 mm diam. *Involucral bracts* numerous, ovate or broadly ovate, 3–7 mm long, 2.7–4 mm wide,

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rounded to acute; outer surface glabrous or with a few scattered hairs on the mid-line and thickened apex; inner surface glabrous. *Floral bracts* spathulate, (2–)3–5(–6) mm long, 1.9–2.5 mm wide; outer surface with a dense indumentum of wavy hairs 1.1–2.2 mm long in the central portion, with appressed, white and brown hairs 0.2–0.4 mm long towards the apex; inner surface glabrous. *Tepals* 12–16 mm long, pink; claw completely or largely glabrous; limb 2.5–3.5 mm long, deep reddish inside, the outer surface densely hairy distally or throughout, with appressed, white hairs 0.8–1.3 mm long. *Anthers* 1.4–2 mm long, yellow. *Pollen presenter* 3–3.5 mm long, yellow at first, turning orange then red, with short, finger-like papillae on the pedestal and bulge, the largest papillae *c.* 0.1 mm long; pedestal with continuous papillae or 4 thick rows of papillae along the 4 main longitudinal ridges; constriction well-developed; bulge 0.35–0.45 mm wide; receptor 1.2–1.5 mm long, glabrous. *Cones* broadly ovoid to depressed-ovoid at first, 6–17 mm wide; axis (after scales shed) ± ovoid; scales broadly obovate-obtriangular, 3.3–5 mm long, 3.5–4 mm wide, with distal margin incurved, glabrous inside and on base outside, the central part with a very dense indumentum of white or ferruginous, long, wavy hairs, the top with appressed, white hairs but becoming glabrous. *Diaspores* ovoid, 2.6–3.3 mm long, 1.2–1.4 mm diam.; largest hairs widely spreading (with some directed downwards), 2.5–3 mm long; seed 1.9–2.2 mm long, 1.1–1.3 mm wide. (Figure 1)

Diagnostic features. Distinguished from other members of the genus by the following combination of characters: glabrous or early-glabrescent stems; simple, terete leaves; pendulous flower heads with glabrous or largely glabrous involucral bracts; pink tepals 12–16 mm long, with a glabrous or largely glabrous claw and a terminal tuft of hairs.

Selected specimens examined. WESTERN AUSTRALIA: Dunn Rock Nature Reserve, 30 km SW of Lake King, 15 Apr. 1984, *D.J. Backshall* 29 (PERTH); disused gravel pit, 23.2 km from Ravensthorpe along Floater Rd, 23 Sep. 2000, *M. Bennett* 597 (PERTH); Dragon Rocks Nature Reserve No. 36128, 20 Sep. 1991, *A.M. Coates* 2874 (PERTH); 14.8 km W of road to Ravensthorpe and Hyden at Lake King, towards Lake Grace, 24 Aug. 1992, *R. Cumming* 12292 (PERTH); *c.* 19 km S of Lake King on Newdegate–Ravensthorpe Rd, 12 Aug. 2017, *R. Davis* 12517 (PERTH); off South Anderson Rock Rd between Williamson and Sedgewick Rds, N of Hyden, 24 Sep. 2000, *J.M. Flint* 219 (PERTH); 15 km N of Ravensthorpe–Ongerup road on Koornong Rd, *c.* 35 km W of Ravensthorpe, 21 Sep. 1984, *D.B. Foreman* 805 (PERTH); Mt Madden, 19 Oct. 1960, *C.A. Gardner* 12878 (PERTH); Lake Camm turnoff, *c.* 22 miles [35 km] E of Newdegate, 14 Oct. 1960, *A.S. George* 1653 (PERTH); 18 km SE of Holt Rock, 17 Sep. 1976, *R.J. Hnatiuk* 760823 (PERTH).

Distribution and habitat. Extends from north of Hyden south-east to near Ravensthorpe, mostly within the Mallee bioregion but with the south-easternmost populations in the Esperance Plains bioregion. Grows on varied soil types including yellow sand over laterite, commonly in mallee or *Allocasuarina* shrubland.

Phenology. Flowers mainly from August to October with fruits continuing to December. There are numerous collections with mature diaspores present.

Conservation status. This species is not currently threatened as several populations occur in nature reserves.

Etymology. The epithet is Latin and means nodding or facing downwards, a reference to the pendulous inflorescences.

Figure 1. *Isopogon nutans*. A – habit, showing pendulous inflorescences; B – inflorescence, showing newly emerged, yellowish pollen presenters with a good coverage of yellow pollen on the receptor, and older, orange to red ones with some or all of the pollen removed. Images by Rob Davis; voucher *R. Davis* 12517.

Vernacular name. Simple-leaved Coneflower. This is one of only four species of *Isopogon* that have consistently simple leaves. The other species are *I. autumnalis* Rye & T.Macfarlane, *I. robustus* N.Gibson and the eastern Australian species *I. fletcheri* F.Muell.

Affinities. *Isopogon nutans* was previously included under *I. teretifolius* subsp. *petrophiloides* (R.Br.) Foreman, a simple-leaved variant of *I. teretifolius* that is no longer considered taxonomically distinct (Rye & Hislop 2017). *Isopogon nutans* differs from *I. teretifolius* in having glabrous or early-glabrescent branchlets and leaves (*cf.* with a dense, appressed indumentum on the branchlets and young leaves), involucral bracts with all or most of the surface glabrous (*cf.* hairs always present on the margins), apiculate floral bracts and cone scales (*cf.* truncate), and tepals with a glabrous claw and densely hairy limb (*cf.* a densely hairy claw and the limb either glabrous or with scattered hairs on its margins or apex). The typical variant of *I. teretifolius* is widespread and overlaps in range with *I. nutans* but maintains its morphological separation, the most obvious difference within the area of overlap being its divided leaves. The simple-leaved variant of *I. teretifolius* is geographically separated from *I. nutans*, occurring in the Stirling Range area.

Isopogon nutans has also been confused with *I. scabriusculus* Meisn., as it resembles subspp. *pubiflorus* Foreman and *stenophyllus* Foreman in having terete, simple leaves (subsp. *scabriusculus* has flattened, usually divided leaves) and overlaps in range with all three subspecies. All subspecies of *I. scabriusculus* differ from *I. nutans* in having short, coiled stem hairs, rougher leaves and erect inflorescences.

Identification. The key provided below distinguishes *I. nutans* from other Western Australian members of the genus with simple, usually more or less terete leaves. Note that four of the taxa keyed out below, *I. adenanthoides* Meisn., *I. divergens* R.Br., *I. scabriusculus* subsp. *scabriusculus* and *I. teretifolius*, usually have divided leaves.

1. Tepals hairy on the whole of the outer surface or at least on the whole of the claw

2. Inflorescences usually pendulous, occasionally erect; branchlets with straight or somewhat curved hairs but no coiled hairs present. Involucral bracts glabrous or partially hairy outside; hairs appressed, ± straight (Eneabba area–Fitzgerald River NP) ..... **I. teretifolius**

2: Inflorescences always erect; branchlets covered with short coiled hairs, sometimes also with long straight hairs. Involucral bracts densely hairy outside; hairs spreading and/or coiled

3. Tepals cream or yellow. Mature leaves 20–65 mm long (Jurien area–Serpentine River) ..... **I. autumnalis**

3: Tepals pink. Mature leaves 80–180 mm long

4. Leaves 2.5–3 mm wide. Mature tepals > 20 mm long; longest hairs *c.* 2 mm long (Parker Range) ..... **I. robustus**

4: Leaves 1–1.7 mm wide. Mature tepals < 20 mm long; longest hairs < 1 mm long (Merredin–near Grass Patch) ..... **I. scabriusculus** subsp. **pubifloris**

1: Tepals with a terminal tuft of hairs, glabrous on all or most of claw

5. Branchlets villous. Mature leaves 12–26 mm long, with fine spreading hairs (Three Springs–Boonanarring NR) ..... **I. adenanthoides**

5: Branchlets glabrous or minutely hairy. Mature leaves 22–180 mm long, ± glabrous or with appressed hairs

6. Flower heads pendulous. Young branchlets with ± appressed, straight hairs or glabrous (N of Hyden– Ravensthorpe area) ..... **I. nutans**

6: Flower heads erect. Young branchlets minutely hairy with coiled hairs (these sometimes restricted to small patches adjacent to axils, with the rest of the stem glabrous), sometimes also with some straighter hairs

7. Stem directly below the inflorescence usually glabrous (although with minute, coiled hairs on young branchlets). Leaves usually 0.7–1 mm wide, rarely up to 1.4 mm wide. Mature cones with a neat, regular outline produced by numerous, tightly packed rows of cone scales (Murchison River–Hyden area) ..... **I. divergens**

7: Stem directly below the inflorescence with minute, coiled hairs. Leaves 1.3–4 mm wide. Mature cones with an irregular outline resulting from few rows of somewhat protruding cone scales (N of Wubin–Bullabulling–Newdegate) ..... **I. scabriusculus** subsp. **stenophyllus**

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